AMENDMENTS TO THE SPECIFICATION

Page 1, lines 1 - 13

Background

Field of Invention

This invention pertains generally to tuning forks for use in rate sensors and, more particularly, to a tuning fork and method in which mass balance is maintained when quadrature error is reduced.

Related Art

Tuning fork rate sensors make use of the Coriolis effect to sense rotation. The tuning fork is driven to oscillate in a drive move in which the tines oscillate in a plane with roughly equal and opposite amplitudes. Under rotation, the tines experience a Coriolis acceleration proportional to the velocity of the tines and in a direction orthogonal to the drive motion. In a double-ended tuning fork, the orthogonal acceleration excites a pickup mode of vibration which causes both the driven set of tines and the other (pickup) set to vibrate out of the plane of the device. In quartz rate sensors, this out-of-plane vibration is detected piezoelectrically in a manner well known in the art.

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U.S. Patent 4,379,244 discloses a tuning fork which has electrodes near the stem of the fork for detecting a voltage which is indicative of asymmetrical oscillation of the tines. A laser is used for removing mass from the front surfaces of the tines in order to provide a symmetrical oscillation of the tines and thus a balanced condition. While this technique may result in a balanced fork, it is not useful in tuning fork rate sensors because it does not provide any adjustment of the quadrature output, and the quadrature offset would, in general, remain quite large.

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Objects of the Invention and Summary

C2 concl

It is in general an object of the invention to provide a new and improved tuning fork and method of manufacture.

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These and other objects are achieved in accordance with the invention by providing a tuning fork and method in which a pair of elongated tines having front and rear surfaces are disposed symmetrically about an axis, and balancing masses on the front surface of one tine and on the rear surface of the other tine are trimmed to reduce quadrature error and also to maintain mass balance between the tines.

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Brief Description of the Drawings

Figure 1 is a top plan view of one embodiment of a tuning fork incorporating the invention.

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Figure 3 is a view similar to Figure 2, illustrating the balancing masses after trimming to reduce quadrature error.

Detailed Description

As illustrated in Figure 1, the tuning fork has a pair of drive tines 11, 12 and a pair of pickup tines 13, 14 which extend in opposite directions from a central body or base 16 and are disposed symmetrically about the longitudinal axis 17 of the device. The body includes a frame 18 which surrounds a central opening 19, with a mounting pad 21 within the opening connected to the frame by relatively thin bridges 22. The tuning fork is formed as a unitary structure of a piezoelectric material such as quartz. Drive and pickup electrodes (not shown) are mounted on the tines in a conventional manner.

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